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THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : José Vincente TOMÁS CLARAMONTE
SERIAL NO. : 09/555,945
FILED : June 6, 2000
FOR : DEVICE FOR DECORATION OF CERAMIC TILES

Certificate of Mailing Under 37 CFR 1.8

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Stephen Gigante, Reg. No. 42,576
(Name of Registered Rep.)

Stephen Callahan 4/10/02
(Signature and Date)

PETITION FOR GRANT OF PRIORITY
UNDER 35 U.S.C. § 119

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Dear Sir:

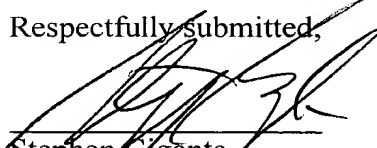
Applicants hereby petition for grant of priority of the present Application on the basis of the following prior filed foreign Applications:

<u>COUNTRY</u>	<u>SERIAL NO.</u>	<u>FILING DATE</u>
Spain	9802136	October 14, 1998

To perfect Applicants' claims to priority, a certified translated copy of the above listed prior filed Application is enclosed.

Acknowledgment of Applicants' perfection of claim to priority is accordingly requested.

Respectfully submitted,


Stephen Gigante
Attorney for Applicant
Registration No. 42,576

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Date: April 10, 2002



VERIFICATION OF TRANSLATION

I, Guido M. Hackländer, of age and with business address at UNGRIA Patentes y Marcas, S.A., Avda. Ramón y Cajal, 78, 28043 Madrid, Spain, hereby state the following:

I am fluent in both the English and Spanish languages and capable of translating documents from one into the other of these languages.

The attached document is a true and accurate English translation to the best of my knowledge and belief of the also attached copy of Spanish patent application No. 9802136.

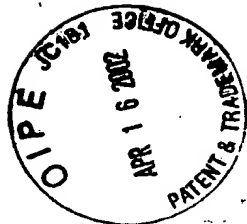
I further state that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true.

Signed this 26th day of February of 2002.

Signature:

Guido M. Hackländer
(Guido M. Hackländer)

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EX

SPANISH OFFICE
OF
PATENTS AND TRADEMARKS

OFFICIAL CERTIFICATE

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It is hereby certified that the accompanying documents are a true copy of the application for PATENT OF INVENTION No. **9802136**, filed in this Organism on **14 October 1998**.

Madrid, 28 April 2000

The Director of the Department
of Patents and Models
P.D.

(signature illegible)

SPANISH OFFICE OF PATENTS AND

TRADEMARKS

APPLICATION FOR:

APPLICATION NUMBER

P 9802136

FILING DATE AND TIME AT THE S.O.P.T.

14 October 1998

FILING DATE AND TIME AT PLACE OTHER THAN S.O.P.T.

(3) FILING PLACE
MADRID

CODE
28

☒ PATENT OF INVENTION

☐ UTILITY MODEL

(1) ☐ ADDITIONAL APPLICATION

☐ DIVISIONAL APPLICATION

☐ CHANGE OF TYPE

☐ EUROPEAN APPLICATION TYPE
TRANSFORMATION

(2) MAINOR ORIGINAL APPLN

TYPE
APPLICATION NUMBER
APPLICATION DATE

TYPE
APPLICATION NUMBER
APPLICATION DATE

4) APPLICANT(S) SURNAMES OR CORPORATE NAME

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TELEPHONE NUMBER:

POSTAL CODE: 12540

COUNTRY CODE: ES

NATIONAL CODE: ES

(6) INVENTOR(S) SURNAMES

NAME

NATIONALITY

NATIONAL CODE

7) ☒ THE APPLICANT IS THE INVENTOR

☐ THE APPLICANT IS NOT THE INVENTOR OR SOLE INVENTOR

(8) TYPE OF OBTAINMENT OF THE RIGHT

☐ WORK INVENTION

☐ CONTRACT

☐ SUCESSION

9) TITLE OF THE INVENTION

DEVICE FOR DECORATION OF CERAMIC TILES

10) INVENTION REFERRING TO OBTAINMENT OF A MICROBIOLOGICAL PROCESS ACCORDING TO ART. 25.2.P.L.

☐ YES

☒ NO

11) OFFICIAL EXHIBITS

PLACE:

DATE:

12) PRIORITY DECLARATIONS

COUNTRY OF ORIGIN:

COUNTRY CODE:

NUMBER:

DATE:

13) THE APPLICANT TAKES ADVANTAGE OF THE EXEMPTION OF TAX PAYMENT FORESEEN IN ART. 162 P.L.

☐ YES

☒ NO

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PROVINCE: IDEM

CODE: 392/1

CODE: 28043

15) LIST OF THE DOCUMENTS WHICH ARE ATTACHED:

☒ SPECIFICATION No. OF PAGES 8

☒ CLAIMS No. OF PAGES 2

☒ DRAWINGS No. OF PAGES 3

☒ ABSTRACT

☐ PRIORITY DOCUMENT

☐ PRIORITY DOCUMENT TRANSLATION

☒ REPRESENTATIVE DOCUMENT

☐ PRINTS

☒ TAS PAYMENT RECEIPT

☐ COMPLEMENTARY INFORMATION SHEET

☐ OTHERS

OFFICIAL'S SIGNATURE

(signature illegible)

SIGNATURE OF APPLICANT OR
REPRESENTATIVE

(signature illegible)

16) NOTIFICATION OF PAYMENT OF GRANT FEE

DIRECTOR OF THE SPANISH OFFICE OF PATENTS AND TRADEMARKS

PATENT

NUMBER:

P 9802136

ABSTRACT AND GRAPHIC

FILING DATE:

14 October 1998

ABSTRACT:

DEVICE FOR DECORATION OF CERAMIC TILES.

It has means (1) for conveyance of the tiles (2) that are printed by means of projection on ink, characterized in that it has at least one head (3) that is constituted by at least two independent printing modules (5) that are connected to a control unit (13) that controls the operation of each printing module (5) independently, in order to print the desired motif.

The printing band *f* of each printing module (5) is located after the adjacent modules (5).

The number of printing modules (5) is such that at least the entire width of the tile is covered. In order to cover this width heads may be arranged in series.

There is at least one head per color to be printed.

The entire described structure permits the printing by means of a single passing of the tile.

DEVICE FOR DECORATION OF CERAMIC TILES

OBJECT OF THE INVENTION

The invention refers to a device and process for decorating ceramic tiles that is based on the projection
5 of ink on the surface to be printed, and whose purpose is to provide a higher printing speed.

Another object of the invention consists of providing the head with total modularity, so that the head is comprised of at least two independent printing modules
10 that are easily replaceable, in such a way that in the event that a failure is produced it suffices to remove the defective printing module and to introduce a new one.

Just as it is expressed in the title of this specification, the invention is applicable to the decoration
15 of ceramic tiles, but it can likewise be used in any sector of the industry that requires the printing of ink on a surface.

BACKGROUND OF THE INVENTION

The use of devices that permit the printing of ink
20 on a surface that is conveyed by a conveyor belt or that is immobile, for which purpose it has a control circuit that controls the operation of a head that carries out the projection of drops of ink for the printing of the desired decorative motif, is conventionally widely known.

25 This type of device has the inconvenience that the head is constituted by a single printing element, in such a way that it does not occupy the entire width of the tile, for which purpose in order to print the complete decorative motif it is necessary to make several passings
30 of the surface or of the head in order to complete the decorative motif, which determines that the printing speed is considerably reduced.

The use of several heads for printing different colors of ink which likewise have the inconvenience that a
35 single head is used for each color of ink is also known

in the prior art. This single head likewise determines the need to make several passings in order to complete the desired motif, which also affects the marking speed which is considerably reduced.

5 It should also be pointed out that conventional heads have the inconvenience that they are not modular and therefore in the event that there is a failure, there is the inconvenience that the repair requires more time.

DESCRIPTION OF THE INVENTION

10 In order to solve the above mentioned inconveniences, the invention has developed a new device for the decoration of a surface by means of printing ink, for which purpose it has means for projecting the ink on the tile in order to print the desired motif; and it is char-
15 acterized in that it has at least one head that is constituted by at least two independent printing modules, that are connected to a control unit that controls the operation of each printing module independently, in order to print the desired motif.

20 The independent printing modules are housed in the head obliquely with respect to the trajectory of the tiles, and each head has to include a sufficient number of printing modules that make it possible to cover at least the entire width of the tile, in such a way that
25 with a single passing of the tile along the conveyor belt, the complete printing of the desired motif is carried out, in such a way that the printing speed is increased.

Wider printing modules could also be used, in such a
30 way that they can be placed perpendicular to the printing axis.

The distribution of the printing modules is done in such a way that they are one after another and/or parallel with a certain unalignment, in such a way that the
35 printing fringe of each one of said printing modules is

housed contiguously to the fringes of other printing modules, covering the entire width of the tile.

Each independent printing module is constituted by a microprocessor and the corresponding memory in order to
5 operate independently under the control of the control unit.

Although it has been indicated that at least two printing modules are used, it is evident that a single printing module may be used, as long as this module has
10 measurements that cover the entire width of the tile.

The device of the invention also considers the possibility of having at least as many parallel heads as printing colors are required to print the desired motif, so that each printing module of each head or heads provided in series, in order to cover the entire width of
15 the tiles is (are) connected with the same ink tank, in such a way that the multicolor printing is done in a single passing, whereby the printing speed is considerably increased.

20 The described structure of the device of the invention permits a superior printing quality to be obtained at 200 dpi (dots per inch).

The control unit of the device of the invention has communication means in order to carry out its connection
25 to other control computers of other devices, or to other computers by network, memory cards and other communication and data storage systems, in such a way that remote management and verification of the printing devices can be carried out.

30 Obviously the device of the invention can operate in combination with other conventional decoration devices, such as flat serigraphy, or rotary serigraphy, devices, decoration with a roller or others existing on the market.

35 The device of the invention can be applied on those

pavings and coverings that are produced by single baking or by double baking, including rapid double baking and porous single baking, and likewise stoneware products and porcelain stoneware products manufactured by single baking. Likewise, the device of the invention is applicable to all those pavings and coverings that are produced by pressing or by extrusion.

It also proves to be evident that the device of the invention can be applied before a first baking or else between successive bakings.

In order to provide a better understanding of this specification and forming an integral part thereof, a series of figures in which the object of the invention has been represented in an illustrative and non-restrictive manner are attached hereto.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a schematic plan view of a possible embodiment of the invention in which four parallel heads are used, each one of the heads being connected to a tank with different colors of ink in order to do the marking in different colors.

Figure 2 shows a bottom view of a possible embodiment of the distribution of two different printing modules in one head.

Figure 3 shows a perspective view of a printing module of those included in figure 2.

Figure 4 shows a perspective view of a possible embodiment of the complete device of the invention.

Figure 5 shows a functional block diagram of a possible embodiment of the control circuits of the device of the invention, that permits independent control of each one of the printing modules.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A description is made hereinafter of the invention based on the above cited figures.

The device of the invention has a conveyor belt (1) that produces the conveyance of the tiles (2) to be printed and in whose trajectory some heads (3) are arranged so that as the tiles pass along the bottom part of the heads the printing of the desired decorative motif on the tiles (2) is produced.

Each one of the heads (3) is connected to an ink tank (4), each one with a different color, in such a way that each one of the heads does the printing corresponding to the color that the tank with which it is connected includes, the printing of the desired decorative motif ending when the tile passes under the last head (3).

Each one of the heads (3) is constituted by a plurality of printing modules (5), provided with the corresponding slot (6) for the discharge of the projected ink. Therefore, each one of the printing modules (5) of a head (3) projects the same color of ink.

A very important characteristic of the device of the invention, consists of that each one of the printing modules (5) is independent and the control thereof, is likewise done independently, just as it will be explained hereinafter.

The printing modules (5) are located obliquely with respect to the head and to the trajectory of the tiles, and are housed in such a way that they cover the entire width of the tiles, in order to achieve with a single passing of the tile the total printing of the decorative motif. Hence, the printing fringe f of each module (5) is located contiguously in order to cover the entire width of the tile.

A single head has been used in the embodiment for the printing of each color, but obviously more heads can be arranged in series, if it were necessary to cover the entire width of the tile.

Each printing module (5) includes a control circuit

(9), a microprocessor (10) and a memory (11) in order to permit the independent operation of the mechanism (12) for injection of the ink that comes out through the slot (6).

5 In order to achieve the independent operation of each one of the printing modules (5), a control unit (13) that controls the independent operation of each one of said printing units (5) has been provided for, for which purpose said control unit (13) has a control circuit (14)
10 that is connected to a microprocessor (16), to a screen (19), to a keyboard (18) and to an outside communications module (15) through which the connection to other computers (17) is made possible.

15 The microprocessor (16) includes the corresponding memory in which the operating program according to the desired decorative motif is included.

Hence, as of the program stored in the microprocessor (16) different instructions are sent to each one of the microprocessors (10) of the printing modules (5) by
20 means of the memories (11), in such a way that each printing module (5) is totally independent and therefore easily replaceable, for which purpose the corresponding connectors that allow the easy removal thereof and the subsequent introduction of a new module are included,
25 thus considerably facilitating the repair in the event of failure.

Therefore, based on the description made, it is easily understood that the decorative motif of the tile is a function of the included program, which in turn should be
30 modified by each one of the microprocessors (10), upon partially reading the information contained in the memory (11), printing different decorative motifs, such as the case of the decoration of marble in which different effects are desired may be, that evidently are not homogeneous for each one of the tiles.
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Just as it has been previously expressed, the control unit (13) permits the connection with other computers (17) in order to allow the exchange of information with other devices and/or to permit the remote management and verification of the printing devices.

Reference number (7) of figure 4, shows a bridge in which the different heads (3) are included, and the front of the machine includes the keyboard (18) by means of which programming of the device is done and the corresponding screen (19) through which the different data that permit the correct operation of the machine are displayed.

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CLAIMS

1.- Device for decoration of ceramic tiles, that has means for conveyance of tiles in whose trajectory means for projection of ink on the tile in order to print the desired motif are arranged; and is characterized in that it has at least one head (3) that is constituted by at least two independent printing modules (5) that are connected to a control unit that controls the operation of each printing module independently in order to print the desired motif.

2.- Device for decoration of ceramic tiles, according to claim 1, characterized in that the independent printing modules (5) are housed obliquely with respect to the trajectory of the tiles, and all in such a way that the marking fringe of each one of said printing modules (5) is located after the adjacent ones.

3.- Device for decoration of ceramic tiles, according to claim 2, characterized in that the independent printing modules (5) are located one after another and/or parallel with a certain unalignment.

4.- Device for decoration of ceramic tiles, according to claim 1 characterized in that each independent printing module (5) is comprised of a microprocessor (10) and the corresponding memory (11) in order to operate independently under the control of the central unit (13).

5.- Device for decoration of ceramic tiles, according to claim 1, characterized in that it has a number of heads in series (3), in such a way that the different printing modules (5) that constitute them occupy at least the entire width of the tile (2).

6.- Device for decoration of ceramic tiles, according to claim 1 or 5 characterized in that at least as many heads (3) in parallel are arranged as printing colors are required in order to print the desired motif.

7.- Device for decoration of ceramic tiles, accord-

ing claim 1, characterized in that the control unit (12) has communication means (15) in order to permit the connection with other computers and to allow the remote management and verification of the device.

5 8.- Device for decoration of ceramic tiles. according to claim 1, characterized in that it has a superior printing quality than 200 dpi.

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ABSTRACT

DEVICE FOR DECORATION OF CERAMIC TILES

It has means (1) for conveyance of the tiles (2) that are printed by means of projection of ink, characterized in that it has at least one head (3) that is constituted by at least two independent printing modules (5) that are connected to a control unit (13) that controls the operation of each printing module (5) independently, in order to print the desired motif.

The printing fringe f of each printing module (5) is located after the adjacent modules (5).

The number of printing modules (5) is such that at least the entire width of the tile is covered. In order to cover this width heads may be arranged in series.

There is at least one head per color to be printed.

The entire described structure permits the printing by means of a single passing of the tile.